

Find $\int_0^5 f(x, y) dx$ and $\int_0^1 f(x, y) dy$.

1. $f(x, y) = 12x^2y^3$

3–14 Calculate the iterated integral.

4. $\int_0^1 \int_1^2 (4x^3 - 9x^2y^2) dy dx$

7. $\int_0^2 \int_0^1 (2x + y)^8 dx dy$

10. $\int_0^1 \int_0^3 e^{x+3y} dx dy$

15–22 Calculate the double integral.

15. $\iint_R (6x^2y^3 - 5y^4) dA, \quad R = \{(x, y) \mid 0 \leq x \leq 3, 0 \leq y \leq 1\}$

19. $\iint_R x \sin(x + y) dA, \quad R = [0, \pi/6] \times [0, \pi/3]$

27. Find the volume of the solid lying under the elliptic paraboloid $x^2/4 + y^2/9 + z = 1$ and above the rectangle $R = [-1, 1] \times [-2, 2]$.

31. Find the volume of the solid enclosed by the paraboloid $z = 2 + x^2 + (y - 2)^2$ and the planes $z = 1, x = 1, x = -1, y = 0,$ and $y = 4$.

38. (a) In what way are the theorems of Fubini and Clairaut similar?

(b) If $f(x, y)$ is continuous on $[a, b] \times [c, d]$ and

$$g(x, y) = \int_a^x \int_c^y f(s, t) dt ds$$

for $a < x < b, c < y < d$, show that $g_{xy} = g_{yx} = f(x, y)$.